SECTION II—REMARKS

Applicants respectfully request reconsideration of the above referenced patent application for the following reasons:

Reply to Applicants' prior remarks

Responsive to Applicants' prior remarks filed January 07, 2011, the Examiner withdraws the objections due to informalities in claims 30, 35, and 40. The Office Action further cancels its double patenting rejection for claims 1 and 23, however, the Office Action now raises a double patenting rejection in view of claims 30, 35, and 44.

Responsive to Applicants' remarks traversing the rejection under 35 U.S.C. § 103 in view of Boariu and Giannakis, the Examiner states at page 2, item 1, that "Applicant's arguments … have been fully considered but they are not persuasive."

Applicants address the new double patenting rejection and the sustained 35 U.S.C. § 103 rejection in the remarks set forth below with respect to the amendments to the claims presented above.

Double patenting rejection of claims 30, 35, and 44:

The Office Action at page 4, item 2, states:

> 2. Claims 30, 35 and 44 are rejected on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 7,782,970.

At page 3, last paragraph, the Office Action further states:

> A timely filed terminal disclaimer in compliance with 37 CFR 1.321 (c) or 1.321 (d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting

> ground provided the conflicting application or patent either is shown to be commonly owned with this application … .

Applicants submit concurrently herewith, a terminal disclaimer to overcome the rejection in accordance with the Examiner's recommendation.

Accordingly Applicants respectfully request the Examiner withdraw to the rejection.

Rejections under 35 U.S.C. § 103

The Office Action rejects claims 30-39 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,865,237 to Boariu et al. ("Boariu") in view of U.S. Patent No. 7,224,744, to Giannakis et al. ("Giannakis"). Applicants respectfully disagree. For example, independent claim 30 has been amended herein to recite:

> 30. (Currently amended) A method comprising:
>
> receiving content for transmission from a wireless communication system having *M* transmit antennae and *N* receive antennae and *Nc* subcarriers, where *Nc*>>*M,N*, the received content for transmission from ~~a plurality of~~ more than two of the *M* transmit antennae, wherein the received content is a vector of input symbols (**s**) of size *Nc* x 1, and wherein the *Nc* subcarriers is the number of subcarriers of a ~~the~~ multicarrier wireless communication channel of the wireless communication system; and
>
> generating a rate-one, space-frequency code matrix from the received content for transmission via the ~~plurality of~~ more than two of the *M* transmit antennae by dividing the vector of input symbols into a number *G* of groups to generate subgroups and multiplying at least a subset of the subgroups by a constellation rotation precoder to produce a number *G* of pre-coded vectors (v_g), wherein successive symbols from the same group transmitted from the same antenna are at a frequency distance that is multiples of *MG* subcarrier spacings. ~~, wherein *M* represents a number of transmit antennae.~~

Thus, Applicants now make express, a relationship between the *Nc* subcarriers and the *M* transmit antennae and *N* receive antennae of the recited wireless communication system, specifically requiring, in accordance with the claimed embodiment, that the subcarriers

"*Nc>>M,N*." Applicants teach such a relationship in the original specification at paragraph [0034], set forth at pages 12-13. That passage teaches:

> Code Design Criteria
>
> [**0034**] According to one example embodiment, **the rate-one, space-frequency code employed herein contemplate use within a MIMO-OFDM system with *M* transmit and *N* receive antennas and *Nc* subcarriers, where *Nc>>M,N***, although the scope of the invention is not limited to such systems and is, indeed, extensible to any multicarrier communication system with any number of subcarriers, transmit antenna(e) and receive antenna(e). Let *C* and *E* be two different space-frequency code words represented by matrices of size *M x Nc*. Assuming that the MIMO channel consists of *L* (matrix) taps, an upper bound on the expected pairwise error probability (averaged over the, e.g., general Rayleigh fading channel realizations) was derived. For the special case of no spatial fading correlation and a uniform power delay profile, the upper bound can be expressed as:
>
> $$P(C \to E) \le \prod_{i=0}^{rank(S)-1} (1+\lambda_i(S)\frac{\rho}{4})^{-N} \quad (1)$$
>
> where ρ is the average signal-to-noise ratio (SNR), $\lambda_i(S)$ is the *i*-th nonzero eigenvalue of *S*. $S=G(C,E)G^H(C,E)$ has dimension *Nc x Nc* where *G(C,E)* is the *Nc x ML* matrix $G(C,E) = [(C-E)^T\ D(C-E)^T \ldots D^{L-1}(C-E)^T]$ and $D = \{e^{-j\frac{2\pi}{Nc}k}\}_{k=0}^{Nc-1}$. For *Nc>ML*, in order to achieve *M N L*-fold diversity, appropriate code design is necessary to ensure that not only the *M x Nc* error matrix (*C-E*) is of full rank over all distinct {*C,E*} pairs, but the stacked matrix *G(C,E)* enjoys full rank as well. Just such a code design is introduced below in the rate-one, space-frequency encoder employed by the diversity agent.

Nothing in the combination of Boariu and Giannakis discloses or suggests "a wireless communication system having *M* transmit antennae and *N* receive antennae and *Nc* subcarriers, **where Nc>>M,N**," as is required in accordance with the amendments to claim 30.

For instance, at page 6, item 5, the Office Action makes reference to Boariu, and particularly points out that Boariu's Figure 3 shows "antennas 314, 316, 318" and further shows a "transmitter 300." That figure is reproduced in pertinent part below as follows:

[REPRODUCED PORTION OF FIGURE 3 FROM BOARIU]

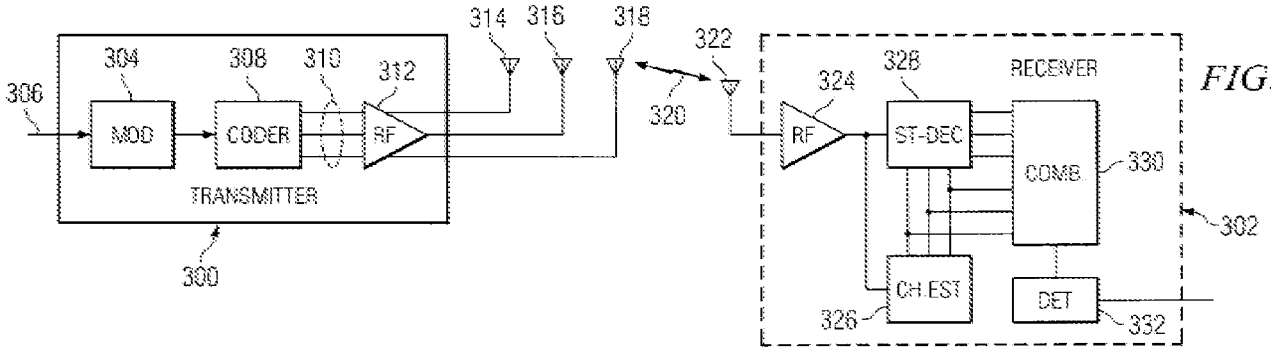

FIG. 3

Thus, as the Office Action correctly points out, Boariu discloses antennas 314, 316, and 318, each communicatively interfaced with the "transmitter" at element 300.

Boariu describes this figure and the antenna and transmitter elements in his disclosure at column 24, lines 33-49, as follows:

> FIG. 3 is an illustration of an arrangement according to an embodiment of the invention--to be use as exemplar only. The figure shows a situation where channel-coded symbols are **transmitted via three antennas** at different frequencies, at different time slots or by using a different spreading code. Firstly, the **figure shows a transmitter 300**, which is in connection with a receiver 302. The transmitter comprises a modulator 304 which receives as input a signal 306 to be transmitted, which consists of bits in a solution according to a preferred embodiment of the invention. The bits are modulated to symbols in the modulator. The symbols to be transmitted are grouped into blocks having the length of a given K. It is assumed in this example that the length of the block is three symbols and that the symbols are s_1, s_2, and s_3. The symbols are conveyed to a coder 308. In the coder each block is coded to NxN' channel symbols. The channel symbols 310 are conveyed in this example via radio frequency parts 312 **to three antennas 314 to 318 from where they are to be transmitted**.

Thus, Boariu provides a mechanism having "transmitter 300" and "three **antennas 314 to 318** from where [symbols] are to be transmitted."

Notwithstanding Boariu's disclosure of a transmitter and antennas, Boariu fails to disclose "a wireless communication system having *M* transmit antennae and *N* receive antennae and *Nc* subcarriers, **where Nc>>M,N**," as is claimed by Applicants.

More specifically, no where does Boariu establish any kind of a relationship between the subcarriers *Nc*, and the "*M* transmit antennae and *N* receive antennae" claimed by Applicants, much less a disclosure that Subcarriers "**Nc>>M,N**," as is claimed.

At page 6, penultimate paragraph, the Office Action correctly concedes that Boariu fails to disclose particular limitations which Applicants recite in independent claim 30, but asserts that Giannakis cures the admitted deficiencies of Boariu.

However, Giannakis does not cure the deficiencies of Boariu because Giannakis is similarly is silent with respect to "a wireless communication system having *M* transmit antennae and *N* receive antennae and *Nc* subcarriers, **where Nc>>M,N**," as Applicants recite in independent claim 30.

Because the combination of Boariu and Giannakis fail to disclose at least one limitation as Applicants recite in independent claim 30, Applicants respectfully submit that independent claim 30 is patentable over the references and in condition for allowance. Applicants further submit that independent claims 35 and 40, which recite similar limitations, as well as those claims which depend directly or indirectly upon independent claims 30, 35 and 40, and thus incorporate the limitations of their respective parent claims, are also patentable over the references and in condition for allowance for at least the same reasons as stated above with respect to independent claim 30 rejected under 35 U.S.C. § 103.

Accordingly, Applicants respectfully request the Examiner to withdraw the rejection to the claims under 35 U.S.C. §103.

Rejection of claims 40-44 under 35 U.S.C. § 103

The Office Action rejects claims 40-44 under 35 U.S.C. § 103(a) as being unpatentable over Boariu in view of Giannakis and U.S. Patent No. 6,801,788, to Csapo et al. ("Csapo").

Csapo, whether considered individually or in any combination with Boariu and/or Giannakis, fails to cure the deficiencies of Boariu and Giannakis as discussed above with respect to the rejection of independent claim 30 under 35 U.S.C. § 103, given that Csapo similarly fails to disclose that "a wireless communication system having *M* transmit antennae and *N* receive antennae and *Nc* subcarriers, **where Nc>>M,N**," as Applicants recite in independent claim 30.

Independent claim 40 claims a similar limitation, reciting: a **number M of omnidirectional antennas**, wherein M comprises more than two omnidirectional antennas; **a number N of receive antennae**; **a number Nc of subcarriers** of a multicarrier wireless communication channel of the wireless communication system, **where Nc>>M,N**." Applicants therefore respectfully submit that independent claim 40 is patentable over Boariu, Giannakis and Csapo for the same reasons as stated above with respect to claim 30.

Dependent claims 41-44 incorporate the limitations of independent claim 40 upon which they directly or indirectly depend, and thus, the dependent claims are patentable over the combination of references and in condition for allowance for at least the same reasons as stated above.

Accordingly, Applicants respectfully request the Examiner to withdraw the rejection to the claims under 35 U.S.C. §103.

CONCLUSION

Given the above remarks, all claims pending in the application are in condition for allowance. If there are any informalities or questions that can be addressed via telephone, the Examiner is encouraged to contact the undersigned attorney at (503) 439-8778.

Charge Deposit Account

Please charge our Deposit Account No. 02-2666 for any additional fee(s) that may be due in this matter, and please credit the same deposit account for any overpayment.

Respectfully Submitted,

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